In [85]:

```
import pandas as pd
import numpy as np
import matplotlib.pyplot as plt
%matplotlib inline
import seaborn as sns
df=pd.read_csv('/home/anudeep/Desktop/data.csv')
df=df.drop(['1'],axis=1)
df
```

Out[85]:

	0.78051	-0.063669
0	0.28774	0.29139
1	0.40714	0.17878
2	0.29230	0.42170
3	0.50922	0.35256
4	0.27785	0.10802
...	...	...
94	0.77029	0.70140
95	0.73156	0.71782
96	0.44556	0.57991
97	0.85275	0.85987
98	0.51912	0.62359

99 rows × 2 columns

In [45]:

```
df.rename(columns = {'0.78051':'X','-0.063669':'Y'}, inplace = True)
```

In [46]:

```
df.head()
```

Out[46]:

	X	Y
0	0.28774	0.29139
1	0.40714	0.17878
2	0.29230	0.42170
3	0.50922	0.35256
4	0.27785	0.10802

In [47]:

```
df.info()
```

```
<class 'pandas.core.frame.DataFrame'>
RangeIndex: 99 entries, 0 to 98
Data columns (total 2 columns):
X    99 non-null float64
Y    99 non-null float64
dtypes: float64(2)
memory usage: 1.7 KB
```

In [48]:

```
X=df['X'].values
Y=df['Y'].values
```

In [49]:

```
m=[0]
C=[0]
costf=[0.0]
iteration=[0]
```

In [95]:

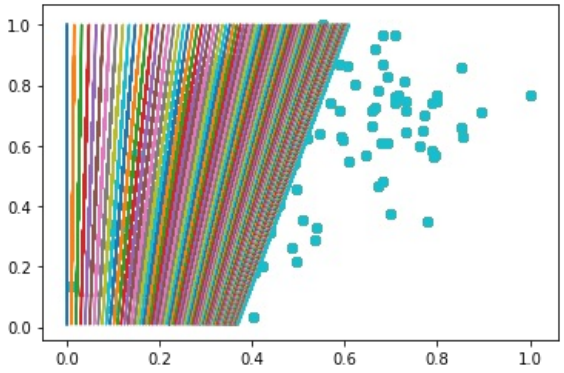
```
def gradient_descent(X,Y):
    m_curr=c_curr=0
    iterations=100
    n=len(X)
    learning_rate=0.01

    for i in range(iterations):
        y_predicted=m_curr*X+c_curr
        cost=(1/n)*sum([val**2 for val in (Y-y_predicted)])
        md=-(2/n)*sum(X*(Y-y_predicted))
        cd=-(2/n)*sum(Y-y_predicted)
        m_curr=m_curr-learning_rate*md
        c_curr=c_curr-learning_rate*cd
        m.append(m_curr)
        C.append(c_curr)
        costf.append(cost)
        iteration.append(i)
        print("m {},c {},cost {},iteration {}".format(m_curr,c_curr,cost,i))
        plt.scatter(X,Y,label='Scatter plot')
        plt.plot(y_predicted,X)
```

In [96]:

```
gradient_descent(X,Y)
```

```
m 0.006110895114233536,c 0.010511038383838378,cost 0.32762999490771716,iteration 0
m 0.01207445633611598,c 0.020748551374367624,cost 0.31303626710089627,iteration 1
m 0.017894444153257243,c 0.030719535756165255,cost 0.2991784335772191,iteration 2
m 0.023574522912245884,c 0.04043080942207954,cost 0.2860193468291373,iteration 3
m 0.02911826327671658,c 0.04988901594701829,cost 0.27352373459090795,iteration 4
m 0.03452914462257134,c 0.05910062904479787,cost 0.2616581051745047,iteration 5
m 0.03981055737196128,c 0.06807195691104254,cost 0.25039065758426926,iteration 6
m 0.04496580526759463,c 0.07680914645504733,cost 0.23969119616906256,iteration 7
m 0.04999810758889681,c 0.08531818742344335,cost 0.22953104958286452,iteration 8
m 0.05491060131150907,c 0.09360491641843202,cost 0.21988299383632148,iteration 9
m 0.059706343211574565,c 0.10167502081328363,cost 0.21072117923272982,iteration 10
m 0.06438831191622336,c 0.109534042567727,cost 0.20202106099236508,iteration 11
m 0.06895940990163206,c 0.11718738194578981,cost 0.19375933337896373,iteration 12
m 0.07342246543999824,c 0.12464030113858353,cost 0.18591386715156702,iteration 13
m 0.07778023449673599,c 0.13189792779446338,cost 0.1784636501738577,iteration 14
m 0.0820354025791652,c 0.13896525845893154,cost 0.17138873102159824,iteration 15
m 0.08619058653793472,c 0.14584716192659097,cost 0.1646701654368215,iteration 16
m 0.09024833632238802,c 0.1525483825073989,cost 0.15828996548506796,iteration 17
m 0.09421113669104861,c 0.15907354320941072,cost 0.152231051279216,iteration 18
m 0.0980814088783731,c 0.16542714884014953,cost 0.14647720514034301,iteration 19
m 0.10186151221888971,c 0.1716135890286821,cost 0.1410130280725912,iteration 20
m 0.10555374572981185,c 0.1776371411704281,cost 0.13582389843522621,iteration 21
m 0.10916034965318852,c 0.18350197329667853,cost 0.13089593270097225,iteration 22
m 0.11268350695862599,c 0.18921214687074825,cost 0.12621594819530477,iteration 23
m 0.11612534480758888,c 0.19477161951263802,cost 0.12177142771670237,iteration 24
m 0.11948793598026299,c 0.20018424765403448,cost 0.11755048594290289,iteration 25
m 0.12277330026593693,c 0.20545378912542858,cost 0.11354183753300628,iteration 26
m 0.12598340581783551,c 0.21058390567708846,cost 0.1097347668398147,iteration 27
m 0.12912017047331356,c 0.2155781654355775,cost 0.10611909915112426,iteration 28
m 0.1321854630402959,c 0.22044004529746597,cost 0.1026851733827859,iteration 29
m 0.1351811045508265,c 0.22517293326184165,cost 0.09942381615024695,iteration 30
m 0.13810886948256765,c 0.22978013070318443,cost 0.09632631714898796,iteration 31
m 0.14097048694906875,c 0.23426485458612945,cost 0.09338440577777993,iteration 32
m 0.14376764185960292,c 0.23863023962360472,cost 0.09059022894202227,iteration 33
m 0.1465019760493498,c 0.24287934037979078,cost 0.0879363299775918,iteration 34
m 0.1491750893806826,c 0.24701513331931343,cost 0.08541562863863551,iteration 35
m 0.151788540816298,c 0.2510405188040438,cost 0.08302140209560081,iteration 36
m 0.15434384946490914,c 0.25495832303884575,cost 0.0807472668925039,iteration 37
m 0.15684249560020294,c 0.2587712999675755,cost 0.07858716181501325,iteration 38
m 0.15928592165374533,c 0.26248213312060564,cost 0.07653533162336963,iteration 39
m 0.1616755331825007,c 0.2660934374151131,cost 0.07458631160648449,iteration 40
m 0.16401269981161423,c 0.269607760909338,cost 0.07273491291576334,iteration 41
m 0.16629875615309,c 0.2730275865119913,cost 0.07097620863929184,iteration 42
m 0.16853500270098076,c 0.27635533364795706,cost 0.06930552057901154,iteration 43
m 0.17072270670369016,c 0.2795933598814071,cost 0.0677184066953969,iteration 44
m 0.1728631030139725,c 0.28274396249741746,cost 0.06621064918593753,iteration 45
m 0.1749573949172003,c 0.2858093800431463,cost 0.06477824316543042,iteration 46
m 0.17700675493845516,c 0.2887917938296088,cost 0.06341738591770306,iteration 47
m 0.17901232562898362,c 0.2916933293950547,cost 0.062124466689919826,iteration 48
m 0.1809752203325452,c 0.29451605793093233,cost 0.06089605700208188,iteration 49
m 0.18289652393216718,c 0.2972619976713934,cost 0.05972890144571389,iteration 50
m 0.18477729357780673,c 0.2999331152472726,cost 0.05861990894704183,iteration 51
m 0.18661855939540864,c 0.3025313270054493,cost 0.05756614447121424,iteration 52
m 0.1884213251778344,c 0.30505850029447645,cost 0.05656482114530323,iteration 53
m 0.19018656905812595,c 0.3075164547173396,cost 0.055613292778943786,iteration 54
m 0.19191524416555603,c 0.30990696335218637,cost 0.054709046762538946,iteration 55
```

```
m 0.19360827926490484,c 0.3122317539418445,cost 0.05384969732397076,iteration 56
m 0.1952665793793924,c 0.31449251005292767,cost 0.05303297912571927,iteration 57
m 0.1968910263976838,c 0.31669087220530595,cost 0.05225674118520507,iteration 58
m 0.1984824796653753,c 0.31882843897269836,cost 0.05151894110203941,iteration 59
m 0.20004177656135744,c 0.32090676805512647,cost 0.05081763957668829,iteration 60
m 0.20156973305944229,c 0.3229273773239482,cost 0.05015099520584021,iteration 61
m 0.20306714427563116,c 0.32489174584017294,cost 0.04951725954050851,iteration 62
m 0.20453478500139036,c 0.32680131484674063,cost 0.04891477239360597,iteration 63
m 0.2059734102232923,c 0.32865748873543144,cost 0.04834195738439782,iteration 64
m 0.2073837556293709,c 0.3304616359890539,cost 0.047797317707875084,iteration 65
m 0.2087665381025308,c 0.33221509009954375,cost 0.04727943211769401,iteration 66
m 0.21012245620134132,c 0.3339191504625893,cost 0.046786951111901405,iteration 67
m 0.211452190628538,c 0.335575083249384,cost 0.04631859331120756,iteration 68
m 0.21275640468754556,c 0.33718412225609024,cost 0.04587314202008822,iteration 69
m 0.21403574472732892,c 0.3387474697315847,cost 0.045449441961485315,iteration 70
m 0.21529084057587056,c 0.3402662971840406,cost 0.04504639617634324,iteration 71
m 0.21652230596256494,c 0.34174174616688757,cost 0.044662963079659806,iteration 72
m 0.2177307389298136,c 0.3431749290446767,cost 0.04429815366515052 5,iteration 73
m 0.21891672223409653,c 0.3445669297393646,cost 0.04395102885102448,iteration 74
m 0.2200808237367896,c 0.3459188044575165,cost 0.04362069695974788,iteration 75
m 0.2212235967849896,c 0.3472315823989173,cost 0.043306311325031654,iteration 76
m 0.22234558058260254,c 0.34850626644706506,cost 0.04300706801962097,iteration 77
m 0.22344730055194442,c 0.34974383384200997,cost 0.042722203697787925,iteration 78
m 0.2245292686860967,c 0.3509452368359914,cost 0.042450993546737696,iteration 79
m 0.22559198389225305,c 0.3521114033323114,cost 0.04219274934142925,iteration 80
m 0.22663593232628737,c 0.3532432375078744,cost 0.04194681759759137,iteration 81
m 0.22766158771876832,c 0.3543416204198097,cost 0.04171257781797548,iteration 82
m 0.228669411692638,c 0.35540741059658465,cost 0.0414894408271402,iteration 83
m 0.22965985407276868,c 0.35644144461400445,cost 0.041276847190296895,iteration 84
m 0.23063335318760506,c 0.3574445376564852,cost 0.041074265711974096,iteration 85
m 0.2315903361630941,c 0.35841748406397667,cost 0.04088119201047041,iteration 86
m 0.23253121920910008,c 0.35936105786490175,cost 0.04069714716427073,iteration 87
m 0.23345640789849664,c 0.36027601329547,cost 0.040521676426792635,iteration 88
m 0.23436629743912327,c 0.3611630853057136,cost 0.04035434800601368,iteration 89
m 0.23526127293878848,c 0.3620229900525858,cost 0.040194751905704304,iteration 90
m 0.23614170966349773,c 0.3628564253804515,cost 0.04004249882515642,iteration 91
m 0.237007973289079,c 0.3636640712892932,cost 0.039897219114455026,iteration 92
m 0.23786042014637498,c 0.3644465903909465,cost 0.03975856178248849,iteration 93
m 0.23869939746016644,c 0.36520462835367046,cost 0.03962619355503548,iteration 94
m 0.23952524358198685,c 0.3659388143353515,cost 0.0394997979804009,iteration 95
m 0.24033828821698466,c 0.3666497614056317,cost 0.03937907458019992,iteration 96
m 0.24113885264498525,c 0.3673380669572441,cost 0.03926373804301137,iteration 97
m 0.24192724993590092,c 0.36800431310683135,cost 0.03915351745873633,iteration 98
m 0.24270378515963345,c 0.3686490670855167,cost 0.039048155591607105,iteration 99
```



In [65]:

```
print(m)
```

```
[0, 0.006110895114233536, 0.01207445633611598, 0.017894444153257243, 0.023574522912245884, 0.0291182
6327671658, 0.03452914462257134, 0.03981055737196128, 0.04496580526759463, 0.04999810758889681, 0.05
491060131150907, 0.059706343211574565, 0.06438831191622336, 0.06895940990163206, 0.07342246543999824
, 0.07778023449673599, 0.0820354025791652, 0.08619058653793472, 0.09024833632238802, 0.0942111366910
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95862599, 0.11612534480758888, 0.11948793598026299, 0.12277330026593693, 0.12598340581783551, 0.1291
2017047331356, 0.1321854630402959, 0.1351811045508265, 0.13810886948256765, 0.14097048694906875, 0.1
4376764185960292, 0.1465019760493498, 0.1491750893806826, 0.151788540816298, 0.15434384946490914, 0.
15684249560020294, 0.15928592165374533, 0.1616755331825007, 0.16401269981161423, 0.16629875615309, 0
.16853500270098076, 0.17072270670369016, 0.1728631030139725, 0.1749573949172003, 0.17700675493845516
, 0.17901232562898362, 0.1809752203325452, 0.18289652393216718, 0.18477729357780673, 0.1866185593954
0864, 0.1884213251778344, 0.19018656905812595, 0.19191524416555603, 0.19360827926490484, 0.195266579
3793924, 0.1968910263976838, 0.1984824796653753, 0.20004177656135744, 0.20156973305944229, 0.2030671
4427563116, 0.20453478500139036, 0.2059734102232923, 0.2073837556293709, 0.2087665381025308, 0.21012
245620134132, 0.211452190628538, 0.21275640468754556, 0.21403574472732892, 0.21529084057587056, 0.21
652230596256494, 0.2177307389298136, 0.21891672223409653, 0.2200808237367896, 0.2212235967849896, 0.
22234558058260254, 0.22344730055194442, 0.2245292686860967, 0.22559198389225305, 0.22663593232628737
, 0.22766158771876832, 0.228669411692638, 0.22965985407276868, 0.23063335318760506, 0.23159033616309
41, 0.23253121920910008, 0.23345640789849664, 0.23436629743912327, 0.23526127293878848, 0.2361417096
6349773, 0.237007973289079, 0.23786042014637498, 0.23869939746016644, 0.23952524358198685, 0.2403382
8821698466, 0.24113885264498525, 0.24192724993590092, 0.24270378515963345, 0.06110895114233536, 0.10
748451304956153, 0.14288717333158896, 0.1701160093848058, 0.19125449513939996, 0.20785346154505444,
0.22106727891679512, 0.2317552210703153, 0.2405569133394688, 0.24794849053969323, 0.2542843968324098
3, 0.2598284984753847, 0.2647772418705669, 0.26927689071578476, 0.2734363560763462, 0.27733674614998
866, 0.28103847441254576, 0.28458655040159, 0.28801451778928977, 0.29134738559672596, 0.294603809976
6686, 0.2977977181745599, 0.30093951728792273, 0.3040369939802046, 0.307095984163795, 0.310120871464
97924, 0.3131149582467306, 0.316080741772905, 0.31902011976665, 0.321934543415039, 0.324825131256522
2, 0.32769275395240516, 0.3305380973865223, 0.333361709633996, 0.3361640359233138, 0.338945444661499
73, 0.3417062468072947, 0.3444467102930698, 0.34716707076136544, 0.3498675395582962, 0.3525483096851
524, 0.35520956023022077, 0.3578514596693781, 0.36047416832466833, 0.363077840196132, 0.365662624327
1163, 0.3682286658223303, 0.37077610660741483, 0.3733050859961026, 0.3758157411141496, 0.37830820721
664415, 0.38078261792594187, 0.38323910541050743, 0.38567780051975925, 0.38809883288615327, 0.390502
33100286963, 0.3928884222833276, 0.39525723310716243, 0.39760888885611356, 0.3999435139423913, 0.402
2612318314329, 0.4045621650604712, 0.4068464352539739, 0.4091141631367424, 0.41136546854525685, 0.41
360047043770387, 0.4158192869030129, 0.41802203516914277, 0.420208831610799, 0.4223797917567165, 0.4
24535030296607, 0.42667466108784635, 0.42879879716195746, 0.4309075507309292, 0.4330010331934036, 0.
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, 0.4452473720877321, 0.44723700890106466, 0.4492122372292264, 0.4511731614152477, 0.453119885046492
9, 0.4550525109601424, 0.4569711412486323, 0.45887587726505363, 0.4607668196285102, 0.46264406822943
7, 0.46450772223487935, 0.4663578800937332, 0.46819463954194696, 0.4700180976076855, 0.4718283506164
5634, 0.4736254941961988, 0.4754096232823359, 0.4771808321227896, 0.47893921428296005, 0.48068486265
066795]
```

In [66]:

```
print(costf)
```

```
[0.0, 0.32762999490771716, 0.31303626710089627, 0.2991784335772191, 0.2860193468291373, 0.2735237345
9090795, 0.2616581051745047, 0.25039065758426926, 0.23969119616906256, 0.22953104958286452, 0.219882
99383632148, 0.21072117923272982, 0.20202106099236508, 0.19375933337896373, 0.18591386715156702, 0.1
7846365017385 77, 0.17138873102159824, 0.1646701654368215, 0.15828996548506796, 0.152231051279216, 0.
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94202227, 0.0879363299775918, 0.08541562863863551, 0.08302140209560081, 0.0807472668925039, 0.078587
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97912571927, 0.05225674118520507, 0.05151894110203941, 0.05081763957668829, 0.05015099520584021, 0.0
4951725954050851, 0.04891477239360597, 0.04834195738439782, 0.047797317707875084, 0.0472794321176940
1, 0.046786951111901405, 0.04631859331120756, 0.04587314202008822, 0.045449441961485315, 0.045046396
17634324, 0.044662963079659806, 0.044298153665150525, 0.04395102885102448, 0.04362069695974788, 0.04
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25, 0.04194681759759137, 0.04171257781797548, 0.0414894408271402, 0.041276847190296895, 0.0410742657
11974096, 0.04088119201047041, 0.04069714716427073, 0.040521676426792635, 0.04035434800601368, 0.040
194751905704304, 0.04004249882515642, 0.039897219114455026, 0.03975856178248849, 0.03962619355503548
, 0.0394997979804009, 0.03937907458019992, 0.03926373804301137, 0.03915351745873633, 0.0390481555916
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970873908, 0.03014155470563995]
```

In [67]:

```
cdm=pd.DataFrame(m,columns=['M'])
cdC=pd.DataFrame(C,columns=['C'])
cdcostf=pd.DataFrame(costf,columns=['cost'])
cdit=pd.DataFrame(iteration,columns=['iteration'])
```

In [68]:

```
jrny=pd.concat([cdm,cdC,cdcostf,cdit],axis=1)
```

In [69]:

```
jrny.head()
```

Out[69]:

	M	C	cost	iteration
0	0.000000	0.000000	0.000000	0
1	0.006111	0.010511	0.327630	0
2	0.012074	0.020749	0.313036	1
3	0.017894	0.030720	0.299178	2
4	0.023575	0.040431	0.286019	3

In [70]:

```
jrny=jrny.drop([0],axis=0)
```

In [71]:

```
jrny.head()
```

Out[71]:

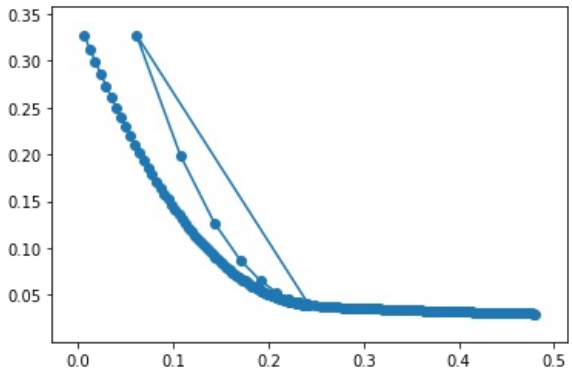
	M	C	cost	iteration
1	0.006111	0.010511	0.327630	0
2	0.012074	0.020749	0.313036	1
3	0.017894	0.030720	0.299178	2
4	0.023575	0.040431	0.286019	3
5	0.029118	0.049889	0.273524	4

In [74]:

```
X1=jrny['M']
Y1=jrny['cost']
```

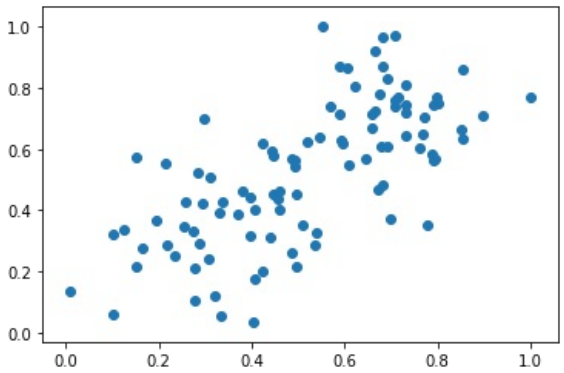
In [75]:

```
plt.scatter(X1,Y1,label='Scatter plot')
plt.plot(X1,Y1,label='Regression line')
plt.show()
```



In [19]:

```
plt.scatter(X,Y)
plt.show()
```



In [ ]:

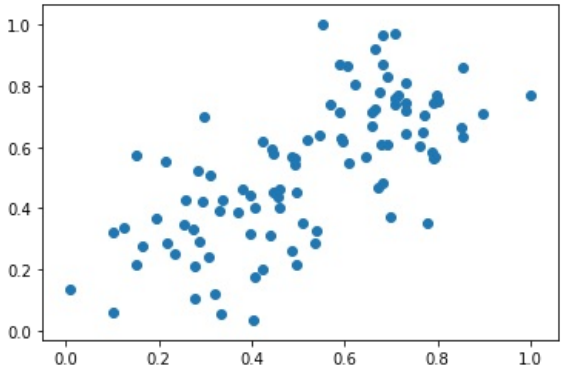
```
for i in range(10):
```

In [78]:

```
plt.scatter(X,Y,label='Scatter plot')
```

Out[78]:

```
<matplotlib.collections.PathCollection at 0x7f1d3b515310>
```



In [ ]:

```

```